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THE MACHRIS BRAZILIAN EXPEDITION

BOTANY: Chlorophyta; Euglenophyta

By G. W. Prescott

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THE MACHRIS BRAZILIAN EXPEDITION

BOTANY: Chlorophyta; Euglenophyta

By G. W. Prescott[1]

The collections upon which the following list of algae is based were taken on an expedition sponsored by Mr. and Mrs. Maurice A. Machris and under the direction of the Los Angeles County Museum[2]. The 26 samples were collected by Dr. E. Yale Dawson, Expedition Botanist, from May 16 through June 6, 1956. All of them came from the vicinity of the Rio Santa Teresa, a tributary of the upper Rio Tocantins between the Serra Dourada and Peixe in central Goiás, Brazil. After tripartite division of each sample, the collections will be deposited in the Museu Nacional do Brasil at Rio de Janeiro, in the Los Angeles County Museum, and in the personal herbarium of the author.

Most of the samples were taken from shallow, rapidly flowing streams and rivulets. This offers one explanation for the paucity of algal species, inasmuch as such habitats are usually not supporters of luxuriant growths. Only nine collections were made in pools and puddles. One of these, No. 15212, from a small stagnant pool, yielded the largest number of species (25). We are not able to state what bearing seasonal conditions and water-chemistry factors may have on the algal flora, but it is obvious that the following list represents a flora which might very well be decidedly different at another time of year.

The fairly large number of acidophilic species in the samples suggests that the waters from which the collections came were not rich in calcium; possibly relatively soft. Two few samples are at hand to provide much generalization, yet it may be worth pointing out that among the desmids (which far exceed other groups in number of species) there is a conspicuous Closterietum-Cosmarietum composition. This is an association which ordinarily is indicative of a reaction approaching neutrality (pH 6.8-7.4). There are few *Staurastrum, Euastrum* and *Micrasterias;* no *Arthrodesmus, Xanthidium, Triploceras* or *Tetmemorus.* The region from which the collections came is tropical, but there appear few of the species previously reported from tropical and subtropical Brazil; rather, they are species mostly of world-wide distribution. This is in contrast to algal col-

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[2] See: The Machris Brazilian Expedition, Botany: General, by E. Yale Dawson. Los Angeles County Museum Contributions in Science (2): 1-20. 1957.

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lections gathered in other parts of Brazil, most of which have been very rich. (See: Bohlin, 1897; Borge, 1892, 1895, 1899, 1903, 1918, 1925; Börgesen, 1890; Grönblad, 1945; Krieger, 1950; Moebius, 1899, 1890; Nordstedt, 1870, 1878, 1889; Schmidle, 1901; Tiffany, 1937; Wille, 1884, for important contributions to our knowledge of Brazilian freshwater algae.)

The following list summarizes the field data corresponding to Dawson's field collection numbers which appear with the determinations of species below.

14844. Along a small stream flowing over rocks and through *cerrado,* 20 km. east of Formoso, May 16, 1956.
15136. In a drying road puddle , 2½ km. southwest of Peixe, June 1.
15146. In a road puddle (green water), 18 km. southwest of Peixe, June 2.
15148; 15149. In a slowly flowing small stream in the sun, 25 km. southwest of Peixe, June 2.
15156. In a flowing rivulet, 30 km. southwest of Peixe, June 2.
15157. In a flowing rivulet, 32 km. southwest of Peixe, June 2.
15161. In a flowing rivulet, 35 km. southwest of Peixe, June 2.
15165. In a slowly moving stream, 41 km. southwest of Peixe, June 2.
15166. In a flowing stream, 43 km. southwest of Peixe, June 2.
15178. In a slowly moving rivulet, 124 km. south-southwest of Peixe, June 3.
15187. In a road puddle, 137 km. south-southwest of Peixe, June 3.
15190. In a drying rivulet in the forest, 140 km. south-southwest of Peixe, June 3.
15200. In a small stream flowing over rocks, 20 km. east of Formoso, June 4.
15203. Seepage among rocks along a small stream, 20 km. east of Formoso, June 4.
15204. On an aquatic plant in a pool below a small waterfall on a rivulet, 20 km. east of Formoso, June 4.
15205. On rocks at the edge of a swiftly flowing small stream, 20 km. east of Formoso, June 4.
15206. On rocks along a small stream, 20 km. east of Formoso, June 4.
15212. In a stagnant pool among rocks near a small stream, 20 km. east of Formoso, June 4.

15216. In a swiftly flowing part of a small stream flowing over rocks, 20 km. east of Formoso, June 4.

15217. Along a small stream flowing over rocks, 20 km. east of Formoso, June 4.

15226. In a sluggish stream in the forest, 18 km. east of Formoso, June 4.

15227. In a forest puddle polluted by cattle, 15 km. east of Formoso, June 4.

15228; 15230. In a small stream flowing over rocks, 21 km. east of Formoso, June 6.

15232 In a palm culvert from a small stream, 21 km. east of Formoso, June 6.

SYSTEMATIC LIST

CHLOROPHYTA

ULOTRICHACEAE

Ulothrix tenerrima Kütz. 15156 Pl. 1, fig. 1

Filaments 9.8-10 μ in diameter, slightly constricted at the joints; chloroplast a broad, incomplete, parietal band with one pyrenoid (or sometimes two); cells both shorter than, and a little longer than wide, up to 10.5 μ long. Entangled with *Spirogyra* and *Mougeotia.*

MICROSPORACEAE

Microspora willeana Lag. 15156 Pl. 1, fig. 2

Filaments slightly constricted at the cross walls; cells 13.5 μ in diameter, 13.5-15 μ long; wall thin; chloroplast a close net-work of pads and narrow strands, covering most of the wall. This occurred as the dominant species in a tangle of filamentous algae.

CHAETOPHORACEAE

Chaetophora elegans (Roth) Ag. 15157; 15166 Pl. 1, fig. 4-7

Colonies soft and amorphous, up to 20 mm. in diameter; filaments loosely spreading, but in general radiate; branching mostly confined to the apical portion of the thallus, the branches both obtusely rounded at the apices and tapering to colorless hairs; cells of the main axis 4.9 μ in diameter, 8.1 μ in diameter in the upper portions, 2-3 times as long as wide.

Chaetophora pisiformis (Roth) Ag. 15165 (det. by Francis Drouet)

Draparnaldia glomerata (Vauch.) Ag. 15148 Pl. 1, fig. 3

Filaments embedded in soft, watery mucilage; main axis slightly constricted at the joints; cells 52.2 μ in diameter, 68 μ long; chloroplast a narrow median band with numerous pyrenoids; branches in glomerate tufts, mostly alternate.

OEDOGONIACEAE

Oedogonium crenulatocostatum Wittr. fa. (?) 15146 Pl. 1, fig. 11-13

Plants macrandrous, dioecious; vegetative cells cylindric, 13 μ in diameter, 42μ long; oogonia ovoid, mostly solitary, 26 μ in diameter, 50 μ long, opening by a superior pore; suffultory cell 16 μ in diameter, 55μ long; oospore with median wall crenulate-costate, with about 6 costae visible; antheridial cells 12 μ in diameter, 5.5-6 μ long.

Oedogonium dawsonii sp. nov. Pl. 1, fig. 14-16

Planta macrandra, dioecia; cellulae elongatae, non capitellatae; (cellula basalis?); cellulae vegetativae 8.4-9.8 μ diam., 46-55 μ long.; oogonia unum vel duo, ovata, 26 μ diam., 49-55 μ long., e poro superiore aperientia, cellula suffultoria paulum ampliata; oospora late ovata, oogonium lateraliter, non, autem, longitudinaliter fere complens; mesosporium scrobiculatum, cellulae antherideae duo antherozoidea 8.5 μ diam., 6.5 μ long. habentes.

Plants macrandrous, dioecious; cells elongate, not capitellate; (basal cell ?); vegetative cells 8.4-9.8 μ in diameter, 48-55μ long; oogonia 1 or 2, ovoid, opening by a superior pore, 26 μ in diameter, 49-55 μ long; suffultory cell very slightly enlarged; oospore broadly oval, nearly filling the oogonium laterally but not in length; median spore wall scrobiculate; antheridial cells with 2 antherozoids, 8.5 μ in diameter, 6.5 μ long.

Type collection: *Dawson 15187*, floating clots in a road puddle, 137 km. south-southwest of Peixe, Goiás, June 3, 1956.

This species should be compared with *Oe. tiffanyi* Achley and with *Oe. wyliei* Tiff., both of which are larger throughout. Also it should be compared with *Oe. discretum* Tiff. which is somewhat larger throughout and has globose rather than oval oospores.

Oedogonium hirnii Gutw. 15178 (det. by L. H. Tiffany)

SCENEDESMACEAE

Scenedesmus bijuga (Turp.) Lag. 15212 Pl. 1, fig. 17

Cells ovate, the poles broadly rounded, adjoined along three-fourths of their lateral walls, 7.9 μ in diameter, 15-20 μ long.

Scenedesmus incrassatulus Bohlin 15212 Pl. 1, fig. 10

Cells ovate, the poles bluntly pointed and the cell walls thickened at the apices, 4.6-5.2 μ in diameter, 14-16 μ long.

Scenedesmus quadricauda var. *quadrispina* (Chodat) G. M. Smith
15212 Pl. 1, fig. 9

Cells oval, 9.2 μ in diameter, 19.5 μ long, the poles broadly rounded; terminal cells with a fine, sharp spine at each pole.

CHARACIACEAE

Schroederia setigera Lemm. 15146 Pl. 1, fig. 18

Cells sigmoid fusiform, the poles drawn into long, slender, spine-like tips; chloroplast reticulate, parietal; cells 6.5 μ in diameter, 85 μ long, including spines.

OOCYSTACEAE

Oocystis eremosphaera G. M. Smith 15212 Pl. 1, fig. 8

Cells solitary, broadly oval, 26.5 μ in diameter, 37 μ long, with a nodular thickening of the wall at the poles; chloroplasts many, plate-like, with irregular margins.

ZYGNEMATACEAE

Spirogyra fluviatilis Hilse 15203 Pl. 3, fig. 1-3

Vegetative cells with plane end walls, 49-51 μ in diameter, chloroplasts three; spore ovoid, the median spore wall rugose-scrobiculate, brown, 52.2 μ in diameter, 75 μ long; conjugation scalariform, the fertile cells swollen medianly.

Spirogyra hyalina Cleve 15190 Pl. 3, fig. 4-5

Vegetative cells 52.2 μ in diam., 81.7 μ long; chloroplasts 3, making one turn; spores elliptic, the membranes smooth, yellow, 42.5 μ in diam., 78.4 μ long; conjugation scalariform, the fertile cells cylindric.

Spirogyra machrisiana sp. nov. Pl. 3, fig. 14-16

Cellulae vegetativae dissepiementis planis, 24-28 μ in diam., 42-45 μ long.; chloroplastus unus, latus, conjugatio scalariformis, tubis e gametangiis contribuentibus plerumque emissis; cellulae fructiferae tumidae aut inflatae, 40.8 μ diam., 83 μ long.; sporae ellipticae, 32.7 μ diam., 55-62 μ long.; mesosporium crasse punctatum, flavum.

Vegetative cells with plane end walls, 24-28 μ in diameter, 42-45 μ long; chloroplast one, broad; conjugation scalariform, the tubes formed mostly by the contributing gametangium; fertile cells swollen or inflated, 40.8 μ in diameter, 83 μ long; spores elliptic, 32.7 μ in diameter, 55-62 μ long; median spore wall coarsely punctuate, yellow.

Type collection: *Dawson 15161,* in a flowing rivulet 35 km. southwest of Peixe, Goiás, June 2, 1956.

This species should be compared with *Sp. taftiana* Trans. which is about the same size, but which has fusiform-inflated, not bullate-swollen, fertile cells, and in which conjugating tubes are formed from both gametangia.

Spirogyra neglecta (Hass.) Kütz. 15203

Cells elongate-cylindric, with plane end walls; chloroplasts three, making four or five turns; conjugation scalariform, the tubes formed from both gametangia; fertile cells slightly swollen medianly; spores elliptic or elliptic-ovoid, 55.5 μ in diameter, 81.7 μ long, or nearly globose, 58 μ in diameter, 65 μ long, the walls smooth, colorless (?).

Spirogyra submarina (Collins) Trans. 15203 Pl. 3, fig. 13

Cells long, with plane end walls, 22.9 μ in diameter, 98 μ long; chloroplasts three, making one and one-half turns; conjugation scalariform, with tubes formed from both gametangia; fertile cells swollen; spores variable, irregularly ovoid or nearly globose, their wall layers smooth, brown, 29.0 μ in diameter, 32-52 μ long.

Spirogyra subsalsa Kütz. 15203 Pl. 1. fig. 21-22

Cells with plane end walls, 23-26 μ in diameter; chloroplast one; conjugation scalariform, the receptive cell enlarged to 33 μ in diameter, 87 μ long; spores elliptic, 24 μ in diameter, 33.3-51.2 μ long, the median spore wall dimpled or slightly rugose, with a longitudinal suture.

Mougeotia rava Trans. (?) 15203 Pl. 1, fig. 19-20, 24

Filaments of long, cylindrical cells 7.5 μ in diameter, 117 μ long; reproduction by akinetes only (?), formed in the midregion of the cell and mostly projecting from the cell or protruding, the cell sharply bent or recurved, the spores occurring on alternate sides of the filament so that it is zig-zag; spores 16-17 μ in diameter, with smooth, gray walls.

DESMIDIACEAE

Cylindrocystis crassa De Bary 15232 Pl. 2, fig. 3

Cells broadly oval, 22.9 μ in diameter, 35.9 μ long.

Netrium digitus var. *naegelii* (Bréb.) Krieg. 15216 Pl. 2, fig. 29

Cells elongate-fusiform, the poles narrowly rounded, 17 μ in diameter, 89 μ long; chloroplast one in each semicell, with longitudinal ridges.

Netrium digitus var. **naegelii** fa. **minus** fa. nov. Pl. 1, fig. 25

Cellulae varietati typicae similes sed minores; chloroplasti duo utraque in semicellula, omnibus pyrenoideo magno praeditis; cellulae 13 μ diam., 62.4 μ long.

Cells similar in shape to the typical variety but smaller, 13 μ in diameter, 62.4 μ long; chloroplasts two in each semicell, with a large pyrenoid in each.

Type collection: *Dawson 15146,* in a road puddle 18 km. southwest of Peixe, Goiás, June 2, 1956.

The interrupted chloroplast in each semicell together with the small size might be considered to be characters that warrant a species designation for this Brazilian plant. The form of the chloroplast is a fundamental attribute.

Penium australe Racib. 15203 Pl. 1, fig. 23

Cells broadly oval, 33 μ in diameter, 51 μ long, the semicell dome-shaped; median constriction a broad, shallow notch.

Penium phymatosporum Nordst. 15216 Pl. 2, fig. 1-2

Cells small, cylindrical, with broadly rounded apices, without a median constriction, 9 μ in diameter, 26 μ long.

Pleurotaenium cylindricum var. *stuhlmanii* (Hier.) Krieg. 15204
Pl. 3, fig. 6-7, 17, 19-20, 32

Cells elongate-cylindric, rectangular in outline, with a slight swelling at the base of the semicell, the poles truncate and furnished with an intra-marginal circle of granules, about 16 showing; chloroplasts in the form of parietal ribbons, widened to inclose the pyrenoids which are numerous; cells 46-53 μ in diameter at the base, 32-48 μ at the poles, 285-690 μ long.

Pleurotaenium maximum (Reinsch) Lund. 15156 Pl. 3, fig. 11-12

Cells stout, elongate-cylindric, with a prominent inflation at the base of the semicell, and strongly invaginated just above the inflation, the margins of the cell nearly parallel, the poles truncate, the angles broadly rounded; walls coarsely punctate, the punctae appearing prominently in the thickened wall at the poles; cells 35.9 μ in diameter at the base, 39 μ in diameter at the poles, 483 μ long.

Pleurotaenium trabecula (Ehr.) Näg.
15204; 15205; 15212 Pl. 3, fig. 9-10, 18

Cells elongate-cylindric, with a slight basal inflation just above the isthmus, the lateral margins subparallel (in ours slightly diverging toward the apex which may be as much as 3 μ wider); walls densely punctate, prominently so in the apex; cells (in ours) frequently occurring in chains because of adherence of mucilaginous sheath (which may be firm and appear as a wall outside the cell wall) 34-39 μ in diameter, up to 455 μ long.

This species occurs in many proportions (width/length). It may be quite stout, the semicells relatively wide toward the apices, and often with one semicell curved.

Pleurotaenium trabecula var. **minutissimum** var. nov. Pl. 2, fig. 30-31

Varietas parva, plantae typicae forma atque proportionibus similis, marginibus parallelis aut subparallelis, non attenuatis; membrana levis (?); cellula 8.8 μ diam., 44 μ long.; isthmus 6.5 μ lat.

A small variety with cells 8.8 μ in diameter, 44 μ long, the isthmus 6.5 μ., similar in shape and proportions to the typical, the margins parallel or subparallel and not tapering; wall smooth (?).

Type collection: *Dawson 15227,* in a forest puddle polluted by cattle, about 25 km. east of Formoso, Goiás, June 4, 1956.

This plant should be compared with *Pl. minutum* (Ralfs) Delp. which is about the same size, but which has no swelling at the base of the semicell.

Pleurotaenium trabecula var. *rectissimum West* & *West* 15230

Cells much elongated, with parallel margins, the poles truncate, 21-26 μ in diameter, 496-628 μ long.

Our specimens are relatively more slender than described for typical *P. trabecula.* This varietal designation is probably not tenable because of the tendency of this species to vary in proportions and in shape in different situations as well as in the same habitat.

Pleurotaenium truncatum (Bréb.) Näg. 14844 Pl. 3, fig. 8

Cells elongate-ovoid in general outline, the margins of the semicells convex, broadest above the base, about one-third the distance to the poles; semicells with a slight swelling just above the isthmus, narrowed toward the poles which are truncate and furnished with an intramarginal circle of six granules, four of them showing in face view; cells 40 μ in diameter at the base, up to 85 μ in diameter in the broadest place, 350-560 μ long.

Closterium acerosum (Schrank) Ehr. 15227 Pl. 4, fig. 2-3

Cells straight or nearly so, 52 μ in diameter, 565 μ long, the dorsal margin convex, the ventral margin straight or slightly convex in the midregion; walls smooth, colorless; pyrenoids numerous, scattered.

Closterium cornu Ehr. 15216 Pl. 2, fig. 16-17

Cells slightly convex on the dorsal margin, straight on the ventral margin, not tumid in the midregion, 6.8 μ in diameter, 68.6-100 μ long; walls smooth, colorless; apices bluntly rounded.

Closterium cynthia De Not. 15161 Pl. 3, fig. 28

Cells short, stout, strongly curved, but the ventral margin straight in the midregion, 14.7 μ in diameter, 88 μ long; walls smooth, colorless.

Closterium kuetzingii Bréb. 15216 Pl. 3, fig. 30

Cells slightly curved, tumid in the midregion, narrowed to the poles which are produced, the lateral margins subparallel, 16.3 μ in diameter, 226 μ long; poles truncately rounded and slightly enlarged at the apices; walls smooth, tan colored; pyrenoids four or five in each semicell.

Closterium kuetzingii var. læve (Racib.) Krieg.
15226 Pl. 3, fig. 29

Plants smaller than the typical, 16 μ in diameter, 280 μ long.

Closterium leibleinii Kütz. 14844: 15200 Pl. 4, fig. 1

Cells with both margins about equally curved, the ventral margin slightly tumid in the midregion, 18.5 μ in diameter, 105-150 μ long.

Closterium moniliferum var. *concavum* Klebs 15226 Pl. 3, fig. 31

Cells equally curved on both margins, the ventral margin not tumid, 46 μ in diam., 270 μ long; walls smooth, colorless.

Closterium parvulum Näg. 15212; 15216; 15156 Pl. 3, fig. 25

Cells small, 10 μ in diameter, 75 μ between poles, both margins equally curved; poles narrow but bluntly rounded; walls smooth, colorless.

Closterium prælongum var. *brevius* Nordst. 15216 Pl. 3, fig. 21-22

Cells elongate, slightly curved, rather abruptly narrowed at the poles which are slightly recurved, 16 μ in diameter, 220 μ long; walls striated (or smooth?), yellow.

Closterium validum West & West 15156 Pl. 3, fig. 23-24

Cells strongly curved, the poles bluntly rounded, 26 μ in diameter, 106 μ between apices; walls striated, brown.

Euastrum dubium Näg. 15216 Pl. 2, fig. 4

Cells 22.9 μ in diameter, 36 μ long.

Euastrum dubium var. *tritum* West & West 15216 Pl. 4, fig. 17-18

An unusual variety with smooth walls; cells 22.9 μ in diameter, 47.5 μ long; isthmus 8 μ.

This variety has been reported previously only from Burma.

Euastrum spinulosum Delp. 15204; 15212 Pl. 4, fig. 12-13

Cells 48 μ in diameter, 62 μ long; isthmus 14 μ.

Euastrum turneri West 15204 Pl. 4, fig. 15-16

Cells 34 μ in diameter, 50.5 μ long; isthmus 7.9 μ.

Micrasterias conferta var. *hamata* fa. *spinosa* Presc. & Scott 15156 Pl. 4, fig. 7

Cells 81.7 μ in diameter, 83.2 μ long; isthmus 16.3 μ.

Micrasterias depauperata var. **kitchellii** fa. **minor** fa. nov. Pl. 4, fig. 6

Forma parva; lobus apicalis productus; incisionibus subapicalibus latis, introrsus late rotundatis; lobi laterales semicellularum bifurcati, omni lobulo bifido; membrana punctata; cellula 58-62 μ lat. in basi, 44-48 μ lat. in apice, 74-76 μ long.

A small form with apical lobe produced; subapical incisions wide and broadly rounded inwardly; lateral lobes of semicells bifurcate, each lobule bifid; walls punctate; cells 58-62 μ in diameter at base, 44-48 μ wide at apex, 74-76 μ long.

Type collection: *Dawson 15212*, in a stagnant pool among rocks near a small stream 20 km. east of Formoso, Goiás, June 4, 1956.

Micrasterias depauperata var. **quadrum** var. nov. Text fig. 1

Varietas differens lobis inferioribus semicellularum quadratis, et invaginationibus marginis minoribus quam in planta typica; lobus apicalis subcuneiformis, lobuli spinis brevibus obtusis praediti; medius sinus angustus, fere per longitudinem inapertus; cellulae 62 μ diam., 85 μ long.

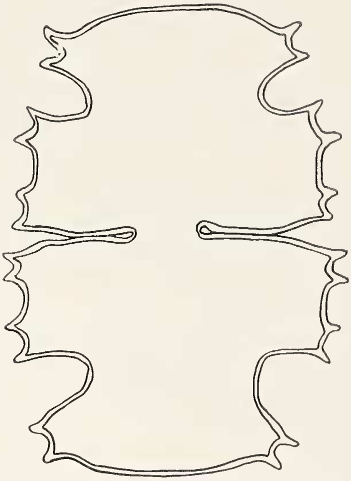

Fig. 1. *Micrasterias depauperata* var. *quadrum* var. nov.

A variety with the lower lobes of the semicell quadrate, the invaginations of the margin less than in the typical plant; apical lobe subcuneiform, the lobules furnished with short, blunt spines; median sinus narrow and closed for most of its length; cells 62 μ in diameter, 85 μ long.

Type collection: *Dawson 15216,* in a swiftly flowing part of a small stream 20 km. east of Formoso, Goiás, June 4, 1956.

This variety approaches some forms of *M. decemdentata* (Näg.) Bréb. and *M. truncata* (Corda) Bréb.

Micrasterias integra Nordst. 15203; 15204; 15212 Pl. 4, fig. 8-10

Cells 107-117 μ in diameter, 110-177 μ long; isthmus 32 μ; lateral angles either bifid (typical) or simple and with one short, stout spine.

Micrasterias laticeps var. *æquilobata* (Borge) Krieg.
15217 Pl. 4, fig. 11

Semicells with equally wide lobes, 90 μ in diameter at base, 85 μ wide at the poles, 100 μ long; walls coarsely punctate.

Micrasterias truncata (Corda) Bréb. 15212 Pl. 4, fig. 4

Cells 125 μ in diameter, 136 μ long; isthmus 25 μ.

Micrasterias truncata var. *pusilla* G. S. West 15232 Pl. 4, fig. 5

Cells smaller than the typical, 62 μ in diameter, 58.7 μ long; isthmus 14 μ.

Actinotænium cruciferum (De Bary) Teiling 15156 Pl. 3, fig. 26

Cells small, 19.6 μ in diameter, 29 μ long; isthmus 17.5 μ; semicells dome-shaped.

Actinotaenium subglobosum (Nordst.) Teiling 15146 Pl. 3, fig. 27

Cells 32.7 μ in diameter, 42.4 μ long; walls finely punctate.

Cosmarium arthrodesmiforme Borge 15156 Pl. 4, fig. 14

Cells 49 μ in diameter, 32.7 μ long; isthmus 11.5 μ.

Cosmarium boeckii Wille 15212; 15228 Pl. 2, fig. 38

Cells 27-31 μ in diameter, 32-35 μ long; isthmus 9.5-9.8 μ.

This species shows considerable variation in the arrangement of granules on the face of the semicell. The semicells are somewhat more nearly trapeziform than in *C. quinarium* Lund. with which it should be compared.

Cosmarium conspersum var. *capense* Hodgetts 15206 Pl. 2, fig. 37

Semicells quadrate-rotund; walls evenly granular, thick; cells 43 μ in diameter, 62 μ long; isthmus 16 μ.

This is an anomalous form which approaches several species in shape of semicell and in its pattern of granulation, but does not conform precisely to any. It should be compared with such species as *C. subbroomei* Schm. and *C. margaritatum* Lund. *C. conspersum* var. *subrotundatum* is larger than our form, but has the same rotund semicell.

Cosmarium hammeri Reinsch fa. 15205 Pl. 2, fig. 23

Cells 26.5 μ in diameter, 39 μ long; isthmus 6.9 μ.

This species should be compared with *C. sexangulare* Grun. and with *C. subcucumis* Schm. Our plants are very similar to a form illustrated by Fritsch and Rich from South Africa.

Cosmarium hammeri var. *javanicum* Bern. 15204 Pl. 2, fig. 19

Cells 24 μ in diameter, 38.7 μ long; isthmus 6.9 μ.

Cosmarium hammeri var. *protuberans* West & West
15230 Pl. 2, fig. 12

Cells 21.2 μ in diameter, 26 μ long; isthmus 5.9 μ.

Cosmarium logiense Biss. fa. 15204; 15212 Pl. 2, fig. 34-36

Semicells hemispherical or rotund; cells 30-33.5 μ in diameter, 43.5-46 μ long; isthmus 11.5 μ.

This material apparently represents a small form of the species. It should be compared with *C. gayanum* De Toni.

Cosmarium margaritatum (Lund.) Roy & Biss.
15204; 15206; 15230 Pl. 4, fig. 24

Cells 50-59 μ in diameter, 64-80 μ long; isthmus 16-18 μ.

Cosmarium notabile var. *minor* Wille 15156 Pl. 2, fig. 5-6

Cells quadrate, the lateral margins of semicell with four undulations, 14.7 μ in diameter, 22.9 μ long; isthmus 12 μ.

Cosmarium polymorphum Nordst. 15156 Pl. 2, fig. 32

Semicells trapeziform in outline; granules on face of semicell hollow; cells 26.2 μ in diameter, 26.2 μ long.

Cosmarium (Actinotænium?) pseudoconnatum Bréb. 15204 Pl. 4, fig. 23

Sinus a broad, shallow notch; semicells dome-shaped; end view round; walls finely punctate; cells 35 μ in diameter, 52 μ long; isthmus 33.5 μ.

Cosmarium pseudopyramidatum var. **peixei** var. nov. Pl. 2, fig. 7-8

Cellulae forma speciei typicae similes sed admodum minores; semicellulæ semipyramidatæ; membrana punctata; cellulae 19.8 μ diam., 35 μ long.; isthmus 6.6-6.9 μ lat.

Cells similar in shape to those of the typical variety, but distinctly smaller, 19.8 μ in diameter, 35 μ long; isthmus 6.6-6.9 μ; semicells semipyramidate; walls punctate.

Type collection: *Dawson 15156,* in a flowing rivulet 30 km. southwest of Peixe, Goiás, June 2, 1956. Additional material: *Dawson 15205,* on rocks at the edge of a swiftly flowing small stream 20 km. east of Formoso, June 4, 1956.

This simple plant is difficult of assignment. Because of its semipyramidate semicells it seems best to place it in the *C. pseudopyramidatum* group in which there is considerable variation in size and shape.

Cosmarium punctulatum var. *pindanum* Skuja 15156 Pl. 2, fig. 13

Margin of cells crenate; poles slightly produced and flattened; granules in midregion more regularly arranged in rows and more prominent than in the marginal region; cells 26 μ in diameter, 26 μ long; isthmus 9.8 μ.

This form is questionably assigned here. It has some characteristics of *C. punctulatum* Bréb., of *C. bipunctatum* Börg., and of *C. furcatospermum* West & West.

Cosmarium quadrifarium Lund. 15232 Pl. 4, fig. 19-20

Cells 39.2 μ in diameter, 52 μ long; isthmus 14 μ.

Cosmarium quadrum var. **depressum** var. nov. Pl. 2, fig. 33

Forma minor; semicellulæ transverse ovato-quadratæ; membrana granulis æqualiter dispositis prædita; cellulae 51 μ diam., 33 μ long.; isthmus 11.5 μ lat.

A small form; semicells transversely ovoid-quadrate; wall with evenly disposed granules; cells 51 μ in diameter, 44 μ long; isthmus 11.5 μ.

Type collection: *Dawson 15212,* in a stagnant pool among rocks near a small stream 20 km. east of Formoso, Goiás, June 4, 1956.

This form should be compared with *C. subbroomei* Schm. which has round-quadrate semicells, but is larger, and is not so compressed vertically.

Cosmarium quinarium var. **granulosum** var. nov. Pl. 2, fig. 9-11

Semicellulæ transverse ovatæ ad semicirculares, angulis inferioribus basalibus par granulorum coniformium prominetium habentibus; superficies semicellulæ ordinatione centrali granulorum magnorum prædita; semicellulæ a vertice visae ovatae, poli par granulorum coniformium atque ordines duos granulorum media in linea, granulis ad centrum magnitudine decrescentibus, præbentes; semicellulæ a latere visæ fere circulares, ordinibus duobus granulorum media in linea atque zona granulosa utroque in latere præditæ; cellulae 30 μ diam., 31 μ long.; isthmus 9.2 μ diam.

Semicells transversely oval to semicircular; lower basal angles with a pair of prominent cone-shaped granules; face of semicell with a central pattern of large granules; end view oval, the poles with a pair of cone-shaped granules and with a double row of granules in the median line, the granules decreasing in size toward the center; lateral view of semicell nearly circular, with a double row of granules in the median line and a granular zone on either side; cells 30 μ in diameter, 31 μ long; isthmus 9.2 μ.

Type collection: *Dawson 15205,* on rocks at the edge of a swiftly flowing small stream 20 km. east of Formoso, Goiás, June 4, 1956.

Cosmarium rectangulare var. *hexagonum* Borge
15156 Pl. 2, fig. 20

Cells 26-29 μ in diameter, 32-33 μ long; isthmus 9.8 μ.

Cosmarium subcucumis var. **parvum** var. nov. Pl. 2, fig. 14-15

Semicellulae quadrato-semiciculares, constrictione profunda, sinu angosto; a vertice visae ovatae, a latere visae ellipticae; membrana levis; cellulae 16 μ diam., 26.5 μ long.; isthmus 3.4 μ lat.

Semicells quadrate-semicircular, the constriction deep, the sinus narrow, oval in end view, elliptic in side view; walls smooth; cells 16 μ in diameter, 26 μ long; isthmus 3.4 μ.

Type collection: *Dawson 15200,* on rocks along a small stream 20 km. east of Formoso, Goiás, June 4, 1956.

Cosmarium ungerianum (Näg.) De Bary 15156 Pl. 2, fig. 18

Cells 29 μ in diameter, 32.7 μ long; isthmus 9.8 μ.

Staurastrum alternans Bréb. 15149 Pl. 2, fig. 21-22

Cells 22.9 μ in diameter, 39 μ long; isthmus 9.8 μ.

Staurastrum crenulatum (Delp.) Näg. 15212 Pl. 2, fig. 24

Cells slightly campanulate but with the upper angles produced to form arms, in end view three-five radiate, 30-32 μ in diameter, 25.5 μ long; isthmus 8 μ.

Staurastrum pseudolagerheimii var. **minor** var. nov. Pl. 4, fig. 21-22

Varietas minor quam specie typica; membrana spinis verrucis praedita; semicellulae campanulatae, inflatione bigranulosa admodum super isthmum; semicellula a vertice visa triangularis, duas verrucas perspicuas bispinatas medio in margine atque verrucam minorem utroque in latere paris, atque 3-4 spinas breves secundum margines angulorum paululum productorum habens; apices angulorum 4 spinis muniti; semicellula a vertice visa etiam seriem intramarginalem spinarum ac verrucarum praebens, regione media, autem, levi; cellulae 34-36 μ diam., 40.8-42 μ long.; isthmus 11.4 μ lat.

A variety smaller than the typical; walls furnished with spines and verrucae; semicells campanulate, with a bigranular swelling just above the isthmus, in end view triangular, with two prominent bispinate verrucae in the midregion of the margin, with a smaller verruca on either side of the pair and with three or four short spines along the margins of the slightly produced angles; apices of the angles tipped with four spines; an intramarginal series of spines and verrucae present; midregion of the semicell smooth when seen in end view; cells 34-36 μ in diameter, 40.8-42 μ long; isthmus 11.4 μ.

Type collection: *Dawson 15216,* in a swiftly flowing part of a small stream 20 km. east of Formoso, Goiás, June 4, 1956.

This variety approaches and includes characteristics of several species of *Staurastrum,* but its combination of features, together with its smaller size renders it difficult to make a precise assignment. It should be compared with *St. submanfeldtii* West & West (approaching var. *elegans* West & West), with *St. manfeldtii* Delp., *St. proboscideum* (Bréb.) Arch., *St. cerastes* Lund., and *St. sebaldii* var. *brasiliense* Börg. It has some features of Turner's questionable *St. opimum* and also of *St. javanicum* (Nordst.) Turner. Thomasson's description of *St. pseudolagerheimii* does no include the vertical view, nor does he illustrate other than the front view. Our plant seems to agree with this northern species, however, except for the much smaller size, being only about half as large as the typical variety.

Staurastrum spongiosum Bréb. fa. 15216 Pl. 5, fig. 17

Semicells in outline broadly oval to nearly spherical, the lateral angles scarcely discernible as such, bearing stout, spinate verrucae; median incision relatively slight, the isthmus broad; semicells in face view with a transverse median series of granular verrucae; cells 45.7 μ in diameter, 55.5 μ long; isthmus 24.6 μ.

This species should be compared with Carlson's questionable *St. skottsbergii* and with *St. subscabrum* Nordst., the latter having a much deeper incision and a narrow sinus.

Desmidium cylindricum Grev. 15149; 15166 Pl. 5, fig. 3-4

Cells 55.5 μ in diameter, 32.7 μ long.

Bambusina borreri (Ralfs) Cleve 15156 Pl. 5, fig. 6-7

Cells 15 μ in diameter, 29.4 μ long.

Hyalotheca dissiliens (Smith) Bréb. 15232 Pl. 5, fig. 1

Cells 24.6 μ in diameter, 13.6 μ long.

Hyalotheca mucosa (Dillw.) Ehr. 15166; 15217 Pl. 5, fig. 2

Cells 27.7 μ in diameter, 19 μ long.

Hyalotheca indica Turner 15212 Pl. 5, fig. 5

Cells 13.5 μ in diameter, 15-16 μ long.

EUGLENOPHYTA

Euglena caudata Hübner 15136 Pl. 5, fig. 20-22

Cells 14-17 μ in diameter, 65 μ long; chloroplasts showing as irregular plates surrounded by paramylum rings.

Euglena ignobilis Johnson (?) 15216 Pl. 5, fig. 13

Cells 6.5 μ in diameter, 58 μ long.

This form is questionably assigned here because preserved material does not disclose all taxonomic features. It might be compared with *E. intermedia* (Klebs) Schmidt which is a much larger species and has much larger paramylum grains. The prominent rings characteristic of *E. ignobilis* do not show, however, in our specimens, but only smaller rings and rods.

Euglena spirogyra Ehr. 15216 Pl. 5, fig. 14-15

Cells 11.5 μ in diameter, 80 μ long.

Trachelomonas cylindrica var. *decollata* Playf. 15226 Pl. 5, fig. 16

Lorica 11.5 μ in diameter, 20.5 μ long.

Trachelomonas hispida var. *coronata* Lemm. 15226 Pl. 5, fig. 8-9

Lorica 23 μ in diameter, 33 μ long; wall brown; spines showing as mucilaginous plugs.

Trachelomonas hispida var. *duplex* Defl.
15212; 15226 Pl. 5, fig. 10-11

Lorica 27-28 μ in diameter, 42-44 μ long; color golden brown.

Trachelomonas oblonga Lemm. fa. 15226 Pl. 2, fig. 27-28

Lorica 10.5 μ in diameter, 11.5-12.5 μ long, golden brown, smooth; flagellum aperture with a slight marginal thickening which also projects inwardly.

Trachelomonas oblonga var. *truncata* Lemm. 15226 Pl. 2, fig. 25-26

Lorica 14 μ in diameter, 18.5 μ long, (often flattened at the anterior end).

Phacus brachykentron Poch. 15226 Pl. 5, fig. 18

Cells 18.5 μ in diameter, 30 μ long, ending posteriorly in a short, straight spine.

Phacus curvicauda Swir. 15226 Pl. 5, fig. 12

Cells 18.5 μ in diameter, 24 μ long, ending posteriorly in a short, curved tail piece.

Phacus oscillans Klebs (?) 15226 Pl. 5, fig. 19

Cells ovate-pyriform, 11.5 μ in diameter, 38 μ long, ending posteriorly in a blunt, spine-like tail piece.

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PLATES

PLATE 1

Fig. 1. *Ulothrix tenerrima* Kütz.
Fig. 2. *Microspora willeana* Lag.
Fig. 3. *Draparnaldia glomerata* (Vauch.) C. A. Ag.
Fig. 4-7. *Chaetophora elegans* (Roth) C. A. Ag. (4: habit of thallus on substrate; 5: habit of branch apex)
Fig. 8. *Oocystis eremosphaera* G. M. Smith
Fig. 9. *Scenedesmus quadricauda* var. *quadrispina* (Chod.) G. M. Smith
Fig. 10. *Scenedesmus incrassatulus* Bohlin
Fig. 11-13. *Oedogonium crenulatocostatum* Wille fa. (12: antheridial cells)
Fig. 14-16. *Oedogonium dawsonii* sp. nov. (14: antheridial cells)
Fig. 17. *Scenedesmus bijuga* (Turp.) Lag.
Fig. 18. *Schroederia setigera* Lemm.
Fig. 19-20. *Mougeotia rava* Trans.
Fig. 21-22. *Spirogyra subsalsa* Kütz.
Fig. 23. *Penium australe* Racib.
Fig. 24. *Mougeotia rava* Trans., aplanospore
Fig. 25. *Netrium digitus* var. *naegeli* fa. *minus* fa. nov.

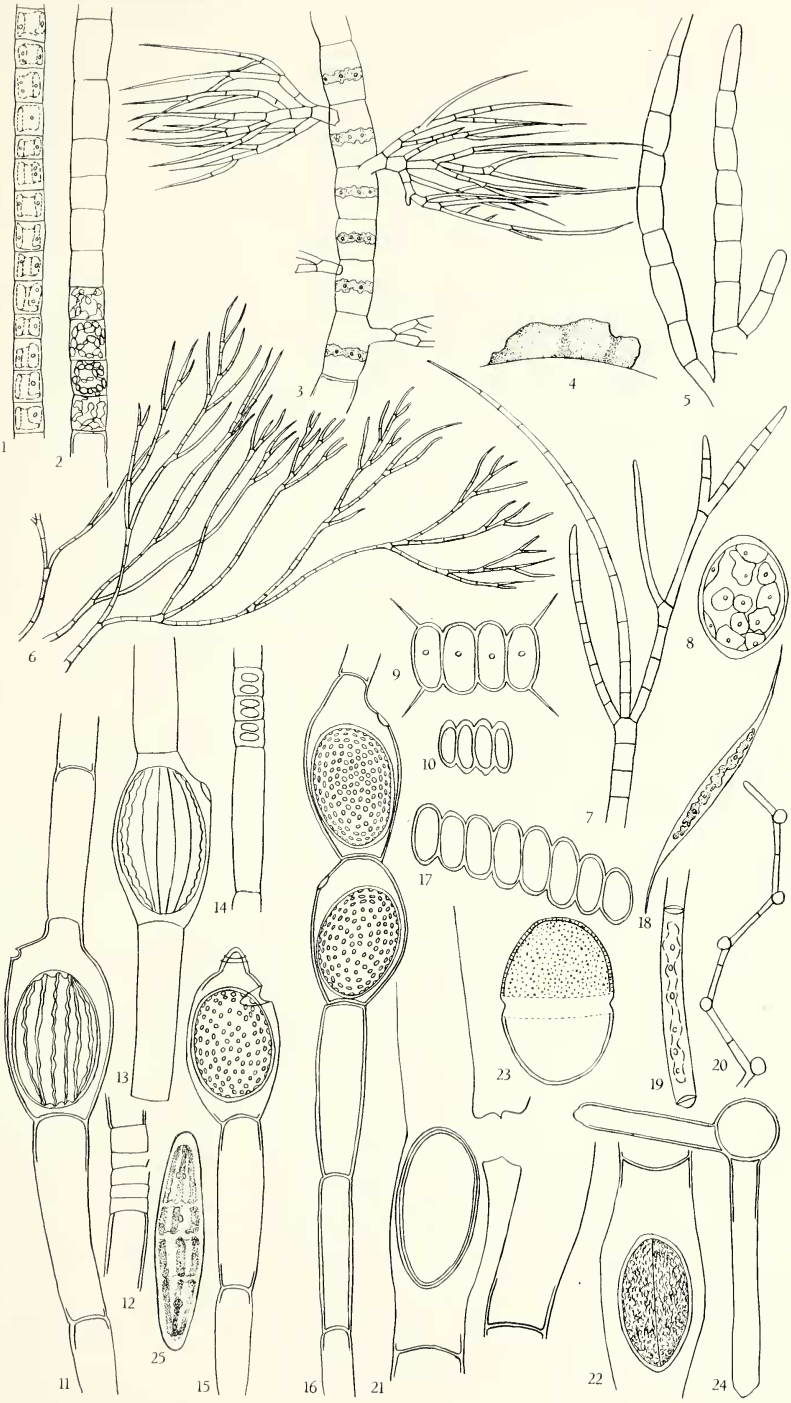
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PLATE 2

Fig. 1-2. *Penium phymatosporum* Nordst.
Fig. 3. *Cylindrocystis crassa* De Bary
Fig. 4. *Euastrum dubium* Näg.
Fig. 5-6. *Cosmarium notabile* fa. *minor* Wille
Fig. 7-8. *Cosmarium pseudopyramidatum* var *peixei* var. nov.
Fig. 9-11. *Cosmarium quinarium* var. *granulosum* var. nov.
Fig. 12. *Cosmarium hammeri* var. *protuberans* West & West
Fig. 13. *Cosmarium punctulatum* var. *pindanum* Skuja
Fig. 14-15. *Cosmarium subcucumis* var. *parvum* var. nov.
Fig. 16-17. *Closterium cornu* Ehr.
Fig. 18. *Cosmarium ungerianum* (Näg.) De Bary
Fig. 19. *Cosmarium hammeri* var. *javanicum* Bern.
Fig. 20. *Cosmarium rectangulare* var. *hexagonum* Borge
Fig. 21-22. *Staurastrum alternans* Bréb.
Fig. 23. *Cosmarium hammeri* Reinsch fa.
Fig. 24. *Staurastrum crenulatum* (Delp.) Näg.
Fig. 25-26. *Trachelomonas oblonga* var. *truncata* Lemm.
Fig. 27-28. *Trachelomonas oblonga* Lemm. fa.
Fig. 29. *Netrium digitus* var. *naegelii* (Bréb.) Krieg.
Fig. 30-31. *Pleurotaenium trabecula* var. *minutissimum* var. nov.
Fig. 32. *Cosmarium polymorphum* Nordst. fa.
Fig. 33. *Cosmarium quadrum* var. *depressum* var. nov.
Fig. 34-36. *Cosmarium logiense* Biss. fa.
Fig. 37. *Cosmarium conspersum* var. *capense* Hodgetts
Fig. 38. *Cosmarium boeckii* Wille

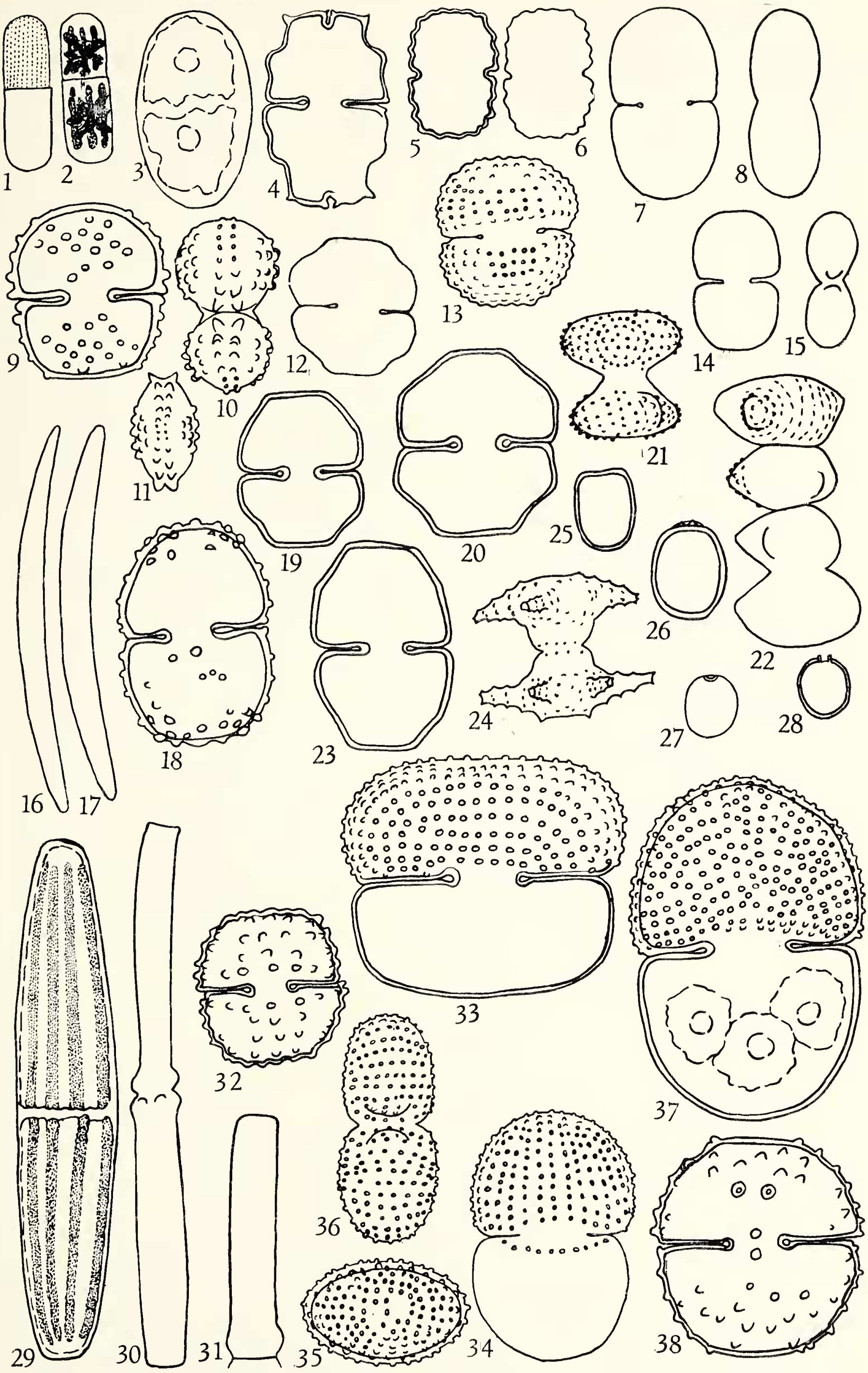
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PLATE 3

Fig. 1-3. *Spirogyra fluviatilis* Hilse
Fig. 4-5. *Spirogyra hyalina* Cleve
Fig. 6-7. *Pleurotaenium cylindricum* var. *stuhlmannii* (Hier.) Krieg.
Fig. 8. *Pleurotaenium truncatum* (Ehr.) Näg.
Fig. 9-10. *Pleurotaenium trabecula* (Ehr.) Näg.
Fig. 11-12. *Pleurotaenium maximum* (Reinsch) Lund.
Fig. 13. *Spirogyra submarina* (Collins) Trans.
Fig. 14-16. *Spirogyra machrisiana* sp. nov.
Fig. 17. *Pleurotaenium cylindricum* var. *stuhlmannii* (Hier.) Krieg.
Fig. 18. *Pleurotaenium trabecula* (Ehr.) Näg.
Fig. 19-20. *Pleurotaenium cylindricum* var. *stuhlmannii* (Hier.) Krieg.
Fig. 21-22. *Closterium praelongum* var. *brevius* Nordst.
Fig. 23-24. *Closterium validum* West & West
Fig. 25. *Closterium parvulum* Näg.
Fig. 26. *Actinotaenium cruciferum* (De Bary) Teiling
Fig. 27. *Actinotaenium subglobosum* (Nordst.) Teiling
Fig. 28. *Closterium cynthia* De Not.
Fig. 29. *Closterium kuetzingii* var. *laeve* (Racib.) Krieg.
Fig. 30. *Closterium kuetzingii* Bréb.
Fig. 31. *Closterium moniliferum* var. *concavum* Klebs
Fig. 32. *Pleurotaenium cylindricum* var. *stuhlmannii* (Hier.) Krieg.

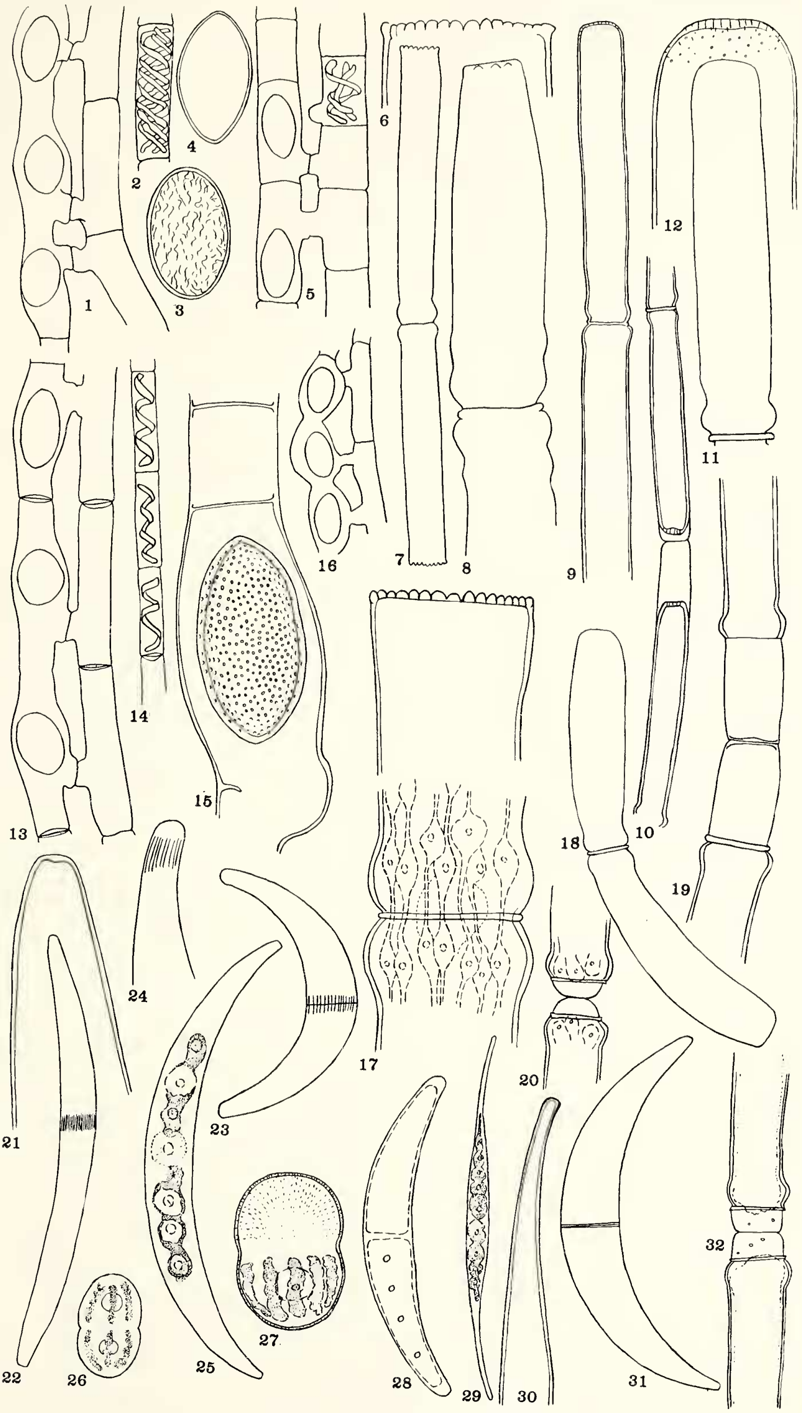

PLATE 4

Fig. 1. *Closterium leibleinii* Kütz.
Fig. 2-3. *Closterium acerosum* (Schrank) Ehr. fa.
Fig. 4. *Micrasterias truncata* (Corda) Bréb.
Fig. 5. *Micrasterias truncata* var. *pusilla* G. S. West
Fig. 6. *Micrasterias depauperata* var. *kitchellii* fa. *minor* fa. nov.
Fig. 7. *Micrasterias conferta* var. *hamata* fa. *spinosa* Presc. & Scott
Fig. 8-10. *Micrasterias integra* Nordst
Fig. 11. *Micrasterias laticeps* var. *aequilobata* (Borge) Krieg.
Fig. 12-13. *Euastrum spinulosum* Delp.
Fig. 14. *Cosmarium arthrodesmiforme* Borge
Fig. 15-16. *Euastrum turneri* West fa.
Fig. 17-18. *Euastrum dubium* var. *tritum* West & West
Fig. 19-20. *Cosmarium quadrifarium* Lund.
Fig. 21-22. *Staurastrum pseudolagerheimii* var. *minor* var. nov.
Fig. 23. *Cosmarium pseudoconnatum* Bréb.
Fig. 24. *Cosmarium margaritatum* (Lund.) Roy & Biss.

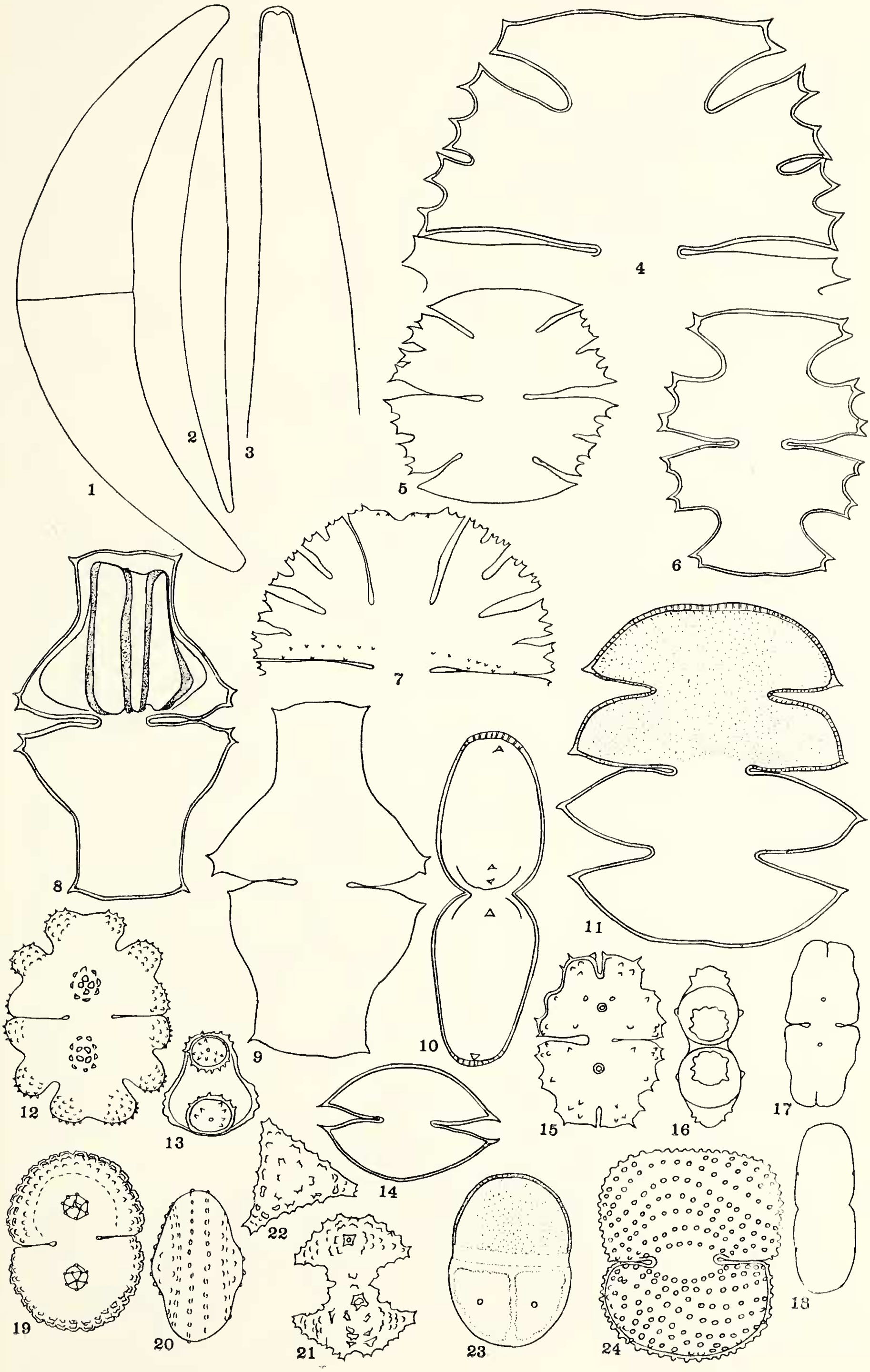
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PLATE 5

Fig. 1. *Hyalotheca dissiliens* (Smith) Bréb.
Fig. 2. *Hyalotheca mucosa* (Dillw.) Ehr.
Fig. 3-4. *Desmidium cylindricum* Grev.
Fig. 5. *Hyalotheca indica* Turn.
Fig. 6-7. *Bambusina borreri* (Ralfs) Cleve (7: showing cell division)
Fig. 8-9. *Trachelomonas hispida* var. *coronata* Lemm.
Fig. 10-11. *Trachelomonas hispida* var. *duplex* Defl.
Fig. 12. *Phacus curvicauda* Swir.
Fig. 13. *Euglena ignobilis* Johns. (?)
Fig. 14-15. *Euglena spirogyra* Ehr.
Fig. 16. *Trachelomonas cylindrica* var. *decollata* Playf.
Fig. 17. *Staurastrum spongiosum* Bréb. fa.
Fig. 18. *Phacus brachykentron* Poch.
Fig. 19. *Phacus oscillans* Klebs (?)
Fig. 20-22. *Euglena caudata* Hübn.